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V. relevant

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(54) Forming a head on carbonated beverages ultrasonically

(57) In order to form or enlarge the head on a carbonated beverage such as beer when it is dispensed, at least a portion of the beverage is subjected to ultrasonic vibration. This vibration causes dissolved gas to come out of solution. The frequency of vibration may be between 20 and 50 kHz. In one practical arrangement a shallow metal dish with an electromagnetic transducer on its underside is recessed into a bar counter. After a glass of beer has been dispensed, the glass is placed in the dish (which contains a little water) and the transducer operated under the control of a push-button to generate ultrasonic vibrations. In another practical arrangement beer flows to a dispense tap through a bore in a block connected to a similar transducer. When the tap is opened a timer starts to operate. At predetermined time intervals the transducer is operated for predetermined time periods, each lasting about one or two seconds. Alternatively the duration of the time intervals is controlled by a flow meter.

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SPECIFICATION

Carbonated beverages

This invention relates to carbonated beverages, that is to beverages containing carbon dioxide in solution. Such beverages may contain another gas or other gases in addition to carbon dioxide. One such additional gas is nitrogen. Carbon dioxide may be generated in the beverage during its manufacture, as is the case in the brewing of beer, or it may be added to the beverage during or after manufacture, as for example in the case of soft drinks to which carbon dioxide is added shortly before they are dispensed.

It is desirable that many kinds of carbonated beverages, particularly beers and those beer-like beverages that contain little or no alcohol, should be dispensed into a glass or other drinking vessel and served or presented for consumption with a head of foam or froth. In the case of beer, deliberate steps are often taken to ensure that it is presented for consumption with a good head. For example, beer may be dispensed into a glass from a dispense tap provided with a "sparkler" which disturbs the otherwise smooth flow of beer as it passes through the sparkler so as to encourage carbon dioxide that is dissolved in the beer to come out of solution and assist in the formation of a head. In other methods of dispensing beer from a keg or like bulk container a measure of beer is dispensed into a glass in two portions, one of which is in a relatively undisturbed state and the other of which is highly disturbed so as to form the major part of a head. None of those methods of encouraging the formation of a head on carbonated beverages is entirely satisfactory. The presence of sparklers slows down the rate at which a beverage can be dispensed, while the use of a two-stage dispensing process either requires skill and experience or involves the use of relatively complex apparatus. An aim of the present invention, therefore, is to provide another method of encouraging head-formation on carbonated beverages and which may be used alone or in conjunction with other methods.

From one aspect the present invention consists in a method of dispensing a carbonated beverage in which method at least a portion of the beverage is subjected to ultrasonic vibration which causes dissolved gas to come out of solution and thereby leads to the formation or enlargement of a head on the beverage.

The carbonated beverage may be subjected to ultrasonic vibration after it has been introduced into a glass or other drinking vessel. Alternatively, or in addition, it may be subjected to ultrasonic vibration before it is introduced into a glass or other drinking vessel, in which case it is preferably subjected to the ultrasonic vibration as it is flowing on its way to the glass or other vessel.

Where carbonated beverage is subjected to ultrasonic vibration after it has been introduced into a glass or other drinking vessel, it is preferred to charge the vessel to the desired extent and then to subject the contents to the vibration, no more beverage being subsequently added. Nevertheless it would be possible to introduce a portion only of a fullmeasure of beverage into the vessel and to subject that portion alone to ultrasonic vibration before the remaining portion of the measure is added. In either method the vibration is preferably transmitted through the glass or other vessel so that nothing extaneous need touch the beverage in the glass or vessel.

Where carbonated beverage is subjected to ultrasonic vibration before it is introduced into a glass or other drinking vessel, the beverage is preferably caused to flow through a duct to a dispense outlet and to be subjected to ultrasonic vibration as it is flowing through the duct.

In a preferred method of dispensing a quantity of carbonated beverage into a glass or other drinking vessel the quantity of beverage is caused to flow through a duct to a dispense outlet, and ultrasonic vibration is applied to the beverage in the duct while only part of that quantity is flowing through it. The ultrasonic vibration may continue for the duration of a period or periods controlled by timing means. Where, as is preferred, there are two or more such periods, the duration of the interval of time or the duration of each interval of time between successive periods may also be controlled by timing means. Alternatively the interval of time or each interval of time between successive periods of ultrasonic vibration may be controlled by a flow meter responsive to the flow of the beverage. The duration of each period and/or each interval may be adjustable. The arrangement may be such that during dispense of a quantity of beverage there may be relatively short initial and terminal periods and at least one intermediate period during each of which beverage flowing through the duct is subjected to ultrasonic vibration.

From another aspect the present invention consists in apparatus for use in dispensing a carbonated beverage comprising ultrasonic means for subjecting at least a portion of the beverage to ultrasonic vibration and thereby causing dissolved gas to come out of solution and lead to the formation or enlargement of a head on the beverage.

The ultrasonic means may comprise an electrically powered ultrasonic transducer connected to a dish or other open-topped container. In use a glass or other drinking vessel containing carbonated beverage can be placed in the container together with some water or other liquid. The transducer can then be caused to operate and bring about the formation or improvement of a head on the beverage. The liquid in the container serves to assist in transmitting ultrasound from the transducer to the glass or other vessel. If desired the transducer, together with a liquid container, if such is included, may be incorporated in or may be mounted on or near a bar counter so as to be readily accessible by someone dispensing beverages at the bar. The apparatus may include a timer operative to enable the transducer to be operated for no more than a predetermined period of time on each operation thereof. The duration of the period may be adjusta-

ble.

In an alternative form of apparatus there is dispense device with a duct through which beverage can pass to a dispense outlet, the ultrasonic means being operative to transmit ultrasonic vibrations into beverage flowing through the duct. The dispense device also preferably incorporates an on/off valve for controlling the supply of beverage, and this may be coupled to the ultrasonic means so that the ultrasonic means operates only when the valve is open.

The apparatus may also include timing means operative to control the duration of the period or periods during which the ultrasonic means is operative during dispense. The timing means may comprise clock means operative to cause the ultrasound means to operate for one or more periods of predetermined duration. The apparatus may include a flow meter responsive to the flow of beverage and operative to control the duration of the interval of time between the periods or between each successive pair of periods of operation of the ultrasonic means. In this way it is possible to ensure that on average each volume of beverage that is dispensed is subjected to ultrasonic vibration for the same total period of time.

There may also be an additional advantage in employing apparatus of the kind incorporating a duct through which the beverage flows and ultrasonic means which transmits ultrasonic vibrations into beverage flowing through the duct. This is that vibrations generated by the ultrasonic means can serve to prevent the build up of deposits in the duct and in neighbouring ducts and can serve to clear or assist in clearing any such deposit that may have formed. In particular the vibrations can serve to prevent or reduce deposits of yeast and other solids which may otherwise be deposited from beer.

Simple experiments can readily enable the most appropriate frequency, power and duration of the ultrasonic vibration for use in any particular circumstances to be determined. It has been found, however, that a frequency of between 20 and 50 kHz is often suitable and that a total period of from one to two seconds of operation may well suffice to produce a good head on a glass of beer. In methods of the kind which involve the use of timing means to control the duration of two or more periods during which the ultrasonic means operates, each period may last for a duration as short as one second or even less that one second.

One particular form of apparatus embodying the present invention is intended for use in producing a head on beer or improving the head on beer. The apparatus comprises an electromagnetic transducer mounted on the underside of a shallow metal dish. The apparatus is fitted into a bar counter with the rim of the dish flush with the surface of the counter. Operation of the transducer is controlled by a manually operable push-button which is located in a suitable position near the dish. In use beer from a keg or other bulk source is dispensed into a glass in such a manner that the beer is relatively undisturbed. The glass is then placed in the dish, which contains a little water, and the push-button is depressed for a short while to cause the transducer to generate ultrasonic vibrations which are transmitted to the beer through the base of the dish, the water in the dish and through the base of the glass. It is found that the vibration causes carbon dioxide that was in solution in the beer to come out solution and to rise to the surface and form a good head on the beer.

If desired the duration of the operation of the transducer may be determined by an adjustable electrically operated timer.

In another form of apparatus embodying the present invention there is a beer dispense head of generally conventional form mounted on a bar and intended for use in dispensing beer from a keg or other bulk supply of beer. The head incorporates a dispense nozzle with an on/off valve at its upper, inlet end. The valve may be manually actuated or it may be actuated by a solenoid. Immediately upstream of the valve is a metal block formed with a through bore which constitutes the duct referred to above. A beer supply pipe is connected to the inlet end of the bore. An ultrasonic transducer is connected to the block and serves to generate ultrasonic vibrations which are transmitted through the block to beer flowing through the bore. The transducer may be such as to vibrate the block in a direction transverse to the bore or parallel with the axis of the bore. In use the beer flowing through the bore is subjected to ultrasonic vibrations which cause dissolved carbon dioxide to come out of solution so that the beer is dispensed with a good head.

Operation of the transducer may be started automatically in response to the valve being opened. It may continue until the valve is closed again but normally operation in that manner would lead to the production of an excessive amount of foam. It is therefore preferred to provide an electronic timer which causes the transducer to operate for short periods while a measure of beer is dispensed; for example there may be one such period occurring at or shortly after the moment the valve is opened, another occurring shortly or immediately before the valve is closed and the third occurring at some intervening time. Each period may be of predetermined duration. Alternatively there may be a flow meter upstream of the block. In use the meter determines the volume of beer flowing through the bore in the block and is arranged to cause the transducer to operate in such a manner that during each dispensing operation beer flowing through the bore is intermittently subjected to ultrasonic vibration, the total duration of such vibration being proportional to the total volume of beer dispensed. Preferably each period of ultrasonic the vibration is of unvarying duration, the duration of time interval between each such period and the next being controlled by the operation of the flow meter. Each such period of ultrasonic vibration may be of relatively short duration as compared with the duration of a typical time interval between successive periods of vibration. The duration of each period of ultrasonic vibration may be adjustable. Moreover,

in addition or alternatively, the relationship between the flow of beer and the duration of the time intervals between periods of ultrasonic vibration may also be adjustable.

CLAIMS

1. A method of dispensing a carbonated beverage in which method at least a portion of the beverage is subjected to ultrasonic vibration which causes dissolved gas to come out of solution and thereby leads to the formation or enlargement of a head on the beverage.

2. A method according to claim 1 in which the carbonated beverage is subjected to ultrasonic vibration after it has been introduced into a glass or other drinking vessel.

3. A method according to claim 2 in which the ultrasonic vibration is transmitted through the glass or other vessel.

4. A method according to any one of claims 1 to 3 in which the carbonated beverage is subjected to ultrasonic vibration before it is introduced into a glass or other drinking vessel.

5. A method according to claim 4 in which the carbonated beverage is subjected to the ultrasonic vibration as it is flowing on its way to the glass or other vessel.

6. A method according to either of claims 4 and 5 in which the beverage is caused to flow through a duct to a dispense outlet and to be subjected to ultrasonic vibration as it is flowing through the duct.

7. A method according to claim 6 in which a quantity of carbonated beverage is dispensed into a glass or other drinking vessel, that quantity being caused to flow through said duct to said dispense outlet, and ultrasonic vibration is applied to the beverage in the duct while only part of that quantity is flowing through it.

8. A method according to claim 7 in which the ultrasonic vibration continues for the duration of a period or periods controlled by timing means.

9. A method according to claim 8 in which there are two or more such periods and the duration of the interval of time or the duration of each interval of time between successive periods is also controlled by timing means.

10. A method according to claim 8 in which there are two or more such periods and the duration of the interval of time or the duration of each interval of time between successive periods is controlled by a flow meter responsive to the flow of the beverage.

11. A method according to any one of the preceding claims in which the frequency of the ultrasonic vibration is in the range of 20 to 50 kHz.

12. A method of dispensing beer substantially as hereinbefore described.

13. Apparatus for use in dispensing a carbonated beverage comprising ultrasonic means for subjecting at least a portion of the beverage to ultrasonic vibration and thereby causing dissolved gas to come out of solution and lead to the formation or enlargement of a head on the beverage.

14. Apparatus according to claim 13 in which the ultrasonic means comprises an electrically powered ultrasonic transducer connected to a dish or other open-topped container.

15. Apparatus according to claim 13 in which there is a dispense device with a duct through which beverage can pass to a dispense outlet, the ultrasonic means being operative to transmit ultrasonic vibrations into beverage flowing through the duct.

16. Apparatus according to claim 15 in which the dispense device also incorporates an on/off valve for controlling the supply of beverage, and this dispense device is coupled to the ultrasonic means so that the ultrasonic means operates only when the valve is open.

17. Apparatus according to either of claims 15 and 16 which also includes timing means operative to control the duration of the period or periods during which the ultrasonic means is operative during dispense.

18. Apparatus according to any one of claims 13 to 17 in which the ultrasonic means is such that in operation it generates ultrasonic vibration at a frequency in the range 20 to 50 kHz.

19. Apparatus for use in dispensing beer substantially as hereinbefore described.

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